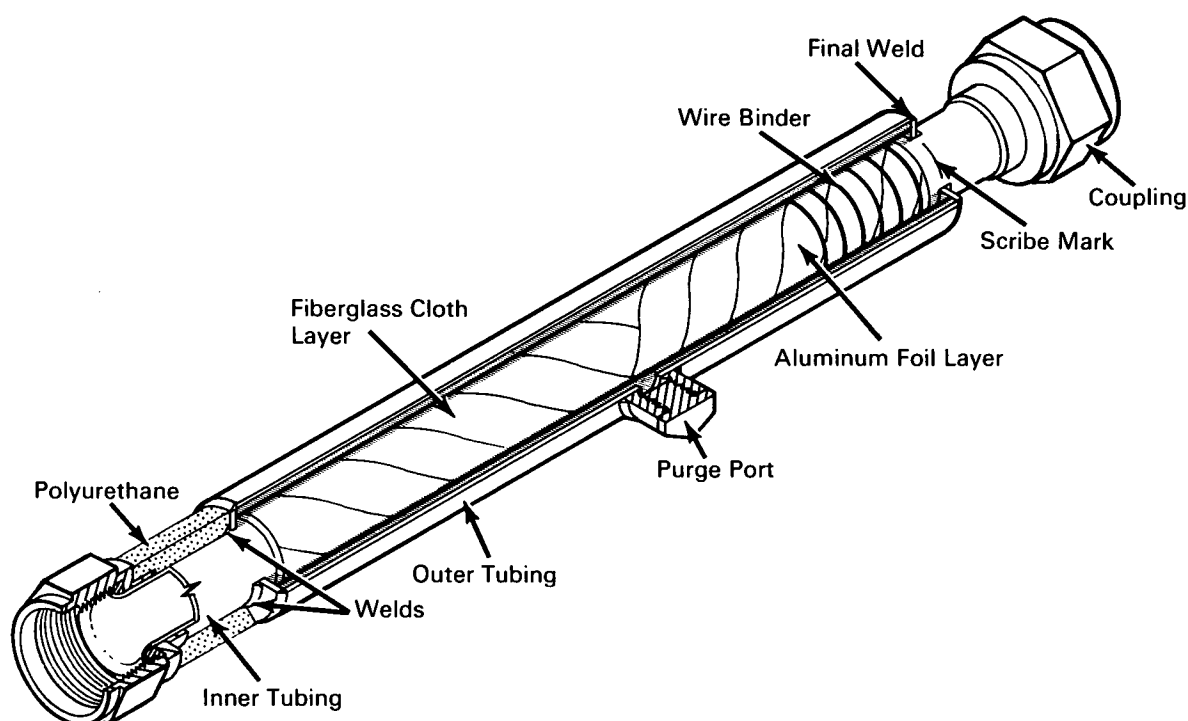


# NASA TECH BRIEF



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## Jacketed Cryogenic Piping Is Stress Relieved



### The problem:

In piping used to transfer cryogenic fluids, the stresses associated with the temperature gradients that occur during transfer cycles and ambient (at rest) periods result in severe stresses. Vacuum jacketing techniques offer some relief but are expensive and require constant attention.

### The solution:

A jacketed cryogenic piping design in which the inner (transfer) pipe is preloaded in such a way that stress relief takes place automatically as cycling occurs.

### How it's done:

A 10-foot section of 1-inch i.d. stainless steel tube is wrapped with a layer of fiberglass cloth and a layer of aluminum foil bound over the fiberglass with wire. The wrapped tube is inserted in a 9-foot section of 1 1/2-inch i.d. stainless steel tube and joined at one end of the outer tube by a washer-shaped disk welded to both tubes. A scribe mark is made on the inner tube at a point on its free end 5/16-inch outboard of the free end of the outer tube. The inner (transfer) tube is forced into a bowed condition within the outer tube until the scribe mark meets the free end of the outer

(continued overleaf)

tube, and a second washer-shaped disk is welded in place between the two tubes, retaining the transfer tube in its preloaded condition. The ends of the transfer tube are fitted with couplings and the areas between couplings and ends of the outer tube are insulated with polyurethane.

Upon chilling from the passage of cryogenic fluid, the transfer tube tends to shrink (straighten out) and after the transfer cycle, returns at ambient temperature to its preload condition.

**Note:**

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B67-10308

**Patent status:**

No patent action is contemplated by NASA.

Source: W. M. Bowers  
of North American Aviation, Inc.  
under contract to  
Marshall Space Flight Center  
(MFS-985)